

WHAT IS CLAIMED IS:

1. A surface acoustic wave device comprising:
first and second double-mode surface acoustic wave resonator filters connected in parallel to each other, each of said first and second double-mode surface acoustic wave resonator filters including a piezoelectric substrate, IDT electrodes and grating reflectors disposed on the piezoelectric substrate; wherein
the first double-mode surface acoustic wave resonator filter has resonance frequencies f_{1L} and f_{1H} , where $f_{1L} < f_{1H}$;
the second double-mode surface acoustic wave resonator filter has resonance frequencies f_{2L} and f_{2H} , where $f_{2L} < f_{2H}$;
 $f_{1H} = f_{2L}$; and
an energy transmittance of the reflectors in at least one of the first and the second double-mode surface acoustic wave resonator filters ranges from about 12% to about 28%.
2. The surface acoustic wave device according to Claim 1, wherein a fractional bandwidth that is a ratio of a passband to the center frequency of the passband ranges from about 0.18% to about 0.22%.
3. The surface acoustic wave device according to Claim 1, wherein the first double-mode surface acoustic wave resonator filter and the second double-mode surface acoustic wave resonator filter are disposed on the same piezoelectric substrate.
4. The surface acoustic wave device according to Claim 1, wherein the piezoelectric substrate is a quartz substrate.
5. The surface acoustic wave device according to Claim 1, wherein the piezoelectric substrate is an LiTaO_3 substrate.
6. The surface acoustic wave device according to Claim 1, wherein the piezoelectric substrate is an LiNbO_3 substrate.
7. The surface acoustic wave device according to Claim 1, wherein the IDT electrodes and the grating reflectors are made of a thin metal film having a thickness of about 3% of a thickness of the piezoelectric substrate.

8. The surface acoustic wave device according to Claim 1, wherein the thin metal film primarily includes Al.

9. A surface acoustic wave device comprising:
first and second double-mode surface acoustic wave resonator filters connected in parallel to each other, each of said first and second double-mode surface acoustic wave resonator filters including a piezoelectric substrate, IDT electrodes disposed on the piezoelectric substrate, and grating reflectors on both sides of a region where the IDT electrodes are disposed in the surface acoustic wave propagation direction; wherein

the first double-mode surface acoustic wave resonator filter has resonance frequencies f_{1L} and f_{1H} , where $f_{1L} < f_{1H}$;

the second double-mode surface acoustic wave resonator filter has resonance frequencies f_{2L} and f_{2H} , where $f_{2L} < f_{2H}$;

$f_{1H} = f_{2L}$; and

a Q factor of a resonance mode of one of the first and the second double-mode surface acoustic wave resonator filter is less than a Q factor of a resonance mode of the other double-mode surface acoustic wave resonator filter.

10. The surface acoustic wave device according to Claim 9, wherein a fractional bandwidth that is a ratio of a passband to the center frequency of the passband ranges from 0.18% to 0.22%.

11. The surface acoustic wave device according to Claim 9, wherein the first double-mode surface acoustic wave resonator filter and the second double-mode surface acoustic wave resonator filter are disposed on the same piezoelectric substrate.

12. The surface acoustic wave device according to Claim 9, wherein the piezoelectric substrate is a quartz substrate.

13. The surface acoustic wave device according to Claim 9, wherein the piezoelectric substrate is an LiTaO_3 substrate.

14. The surface acoustic wave device according to Claim 9, wherein the piezoelectric substrate is an LiNbO_3 substrate.

15. The surface acoustic wave device according to Claim 9, wherein the IDT electrodes and the grating reflectors are made of a thin metal film having a thickness of about 3% of a thickness of the piezoelectric substrate.

16. The surface acoustic wave device according to Claim 9, wherein the thin metal film primarily includes Al.